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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant : D. Amnon Silverstein

Art Unit : 2612

Serial No. : 09/484,667

Examiner : Rosendale, Matthew L.

Filed : Jan. 18, 2000

Title : POINTING DEVICE FOR DIGITAL CAMERA DISPLAY

Commissioner for Patents

P.O. Box 1450

Alexandria, VA 22313-1450

#17
Pat 6-22-04
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EXHIBIT A

Technology Center 2600

CERTIFICATE OF MAILING

I hereby certify that this correspondence is being deposited with the United States Postal Service as First Class Mail in an envelope addressed to:
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June 14, 2004

Date

(Signature of person mailing papers)

Edouard Garcia

(Typed or printed name of person mailing papers)



INVENTION DISCLOSURE

PDNO

10982103

DATE RCVD

PAGE ONE OF 23

ATTORNEY

CPL/TRC

Instructions: The information contained in this document is **COMPANY CONFIDENTIAL** and may not be disclosed to others without prior authorization. Submit this disclosure to the HP Legal Department as soon as possible. No patent protection is possible until a patent application is authorized, prepared, and submitted to the Government.

Descriptive Title of Invention:

Pointing device for digital camera displays

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Name of Project: Perceptual Image Quality

Product Name or Number:

Technology Center 2600

Was a description of the invention published, or are you planning to publish? If so, the date(s) and publication(s):

No

Was a product including the invention announced, offered for sale, sold, or is such activity proposed? If so, the date(s) and location(s):

No

Was the invention disclosed to anyone outside of HP, or will such disclosure occur? If so, the date(s) and name(s):

No

if any of the above situations will occur within 3 months, call your IP attorney or the Legal Department now at 1-857-2542 or 415-857-2542

Was the invention described in a lab book or other record? If so, please identify (lab book #, etc.):

2214-22

Was the invention built or tested? If so, the date:

9/20/98

Was this invention made under a government contract? If so, the agency and contract number:

No

Description of Invention: Please preserve all records of the invention and attach additional pages for the following. Each additional page should be signed and dated by the inventor(s) and witness(es).

- A. Prior solutions and their disadvantages (if available, attach copies of product literature, technical articles, patents, etc.).
- B. Problems solved by the invention.
- C. Advantages of the invention over what has been done before.
- D. Description of the construction and operation of the invention (include appropriate schematic, block, & timing diagrams; drawings; samples; graphs; flowcharts; computer listings; test results; etc.)

Signature of Inventor(s): Pursuant to my (our) employment agreement, I (we) submit this disclosure on this date: [REDACTED].

Employee No.	Name	Signature	Telnet	Mailstop	Entity & Lab Name
467189	David Amnon Silverstein		857 7669	1U20	HPL / CPL/ITD

(If more than four inventors, include additional information on another copy of this form and attach to this document)

**INVENTION DISCLOSURE**

COMPANY CONFIDENTIAL

PAGE 2 OF 23**Signature of Witness(es):** (Please try to obtain the signature of the person(s) to whom invention was first disclosed.)

The invention was first explained to, and understood by, me (us) on this date: []

Full Name

Russell Iimura

Signature

Russell M. Iimura

Date of Signature

[REDACTED]

Full Name

Xuemei Zhang

Signature

Xuemei Zhang

Date of Signature

[REDACTED]

Inventor & Home Address Information: (If more than four inventors, include addl. information on a copy of this form & attach to this document.)**RECEIVED**

JUN 21 2004

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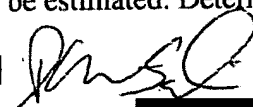
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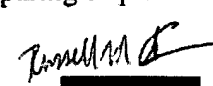
Description of invention: Please preserve all records of the invention and attach additional pages to the following. Each additional page should be signed and dated by the inventor(s) and witness(es).

- A. Prior solutions and their disadvantages (if available, attach copies of product literature, technical articles, patents, etc.).
- B. Problems solved by the invention.
- C. Advantages of the invention over what has been done before.
- D. Description of the construction and operation of the invention (include appropriate schematic, block, & timing diagrams; drawings; samples; graphs; flowcharts; computer listings; test results; etc.)

The invention described here allows a digital camera to be used as a pointing device. The motion of the camera is detected, and the motion of the camera is used to position graphic elements on the camera's own display. The camera's motion can be detected with sensors, such as gyroscopes, or the camera itself can be used as a motion sensor. One application of this involves using the camera as a computer mouse, or like a gun-sight, to select images from a sheet of low-resolution ("thumbnail") images. The motion of the camera is tracked, and the user aims at the desired image from a sheet of thumbnails. This application is illustrated in figures 1 and 2. I have implemented this using optical motion tracking software developed by Andrew Patti.

- A. **Prior solutions:** Digital cameras have not generally used pointing devices to interact with the interface presented on the display. Typically, they use a set of push buttons to step through menus and to select images from memory for display and deletion. New digital cameras may rely on micro display devices, instead of the now more common panel display. To view a micro display, the user needs to hold the display close to his or her eye and view the display through an eyepiece. This arrangement makes the interface controls more difficult to use, since the user will not be able to see the controls while viewing the display.
- B. **Problems solved:** The present invention allows the user to interact with the information display in a way similar to the computer mouse. In the present invention, the entire body of the camera is moved, and the movement of the camera is recorded. The motion information can then be used to position a cursor, or to position graphic elements. For example, graphic elements can be positioned so they stay fixed relative to the world as the user moves the camera.
- C. **Advantages of the new method:** With most digital still cameras, the user can load a previously captured image to the display by selecting it from a grid of low-resolution ("thumbnail") images. The thumbnail is selected by pressing buttons that move a cursor across the thumbnails until the desired picture is under the cursor. With the new method, the user can look into a micro display and will be presented with the thumbnails. A computer can continuously reposition the thumbnails so they appear to be fixed relative to the world. The user can then select a thumbnail by simply pointing the camera at the desired thumbnail.
- D. **Description of the invention:** In the present implementation, the position of the camera is tracked by optical flow. The camera records a sequence of images. By comparing the images with each other, the motion of the camera can be estimated. Determining the motion of the camera by comparing sequential





images taken with the camera as well described in the literature, and this approach has the advantage of not requiring any additional hardware. Alternative implementations could use sensors such as gyroscopes, tilt sensors, compasses, etc to measure the position of the camera. These solutions would be more robust, but may be more expensive to implement.

